EVPP 506 SCIENCE OF THE ENVIRONMENT I

GEORGE MASON UNIVERSITY

3 Credit Hours Spring 2020

4:30-7:10 p.m. Tuesdays, David King 3006

Instructor: Dr. Esther Peters epeters2@gmu.edu 703-624-0143
Office Hours: DK 3050: Tuesdays, 3:15–4:15 p.m. or by appointment (send e-mail request)

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https://ready.gmu.edu/masonalert/ alert.gmu.edu

See Emergency Preparedness Guides: https://ready.gmu.edu/be-prepared/

Description: Environmental science is explored in this 2-semester sequence providing the foundation in chemistry (I) and biology (II) required for graduate students with social sciences backgrounds seeking a degree and career in environmental science and policy. This course will examine the multitude of environmental problems (global warming, energy sources, air and water pollution) facing society with an emphasis on understanding the chemistry involved. The basic principles of chemistry will be reviewed and applied in a manner that will enable the student to develop a framework for evaluating current and future threats to the environment.

Course Objectives:

- To equip students with the knowledge needed to understand the basic chemical nature of environmental problems.
- To prepare students for more advanced environmental science courses.
- To relate molecules to structures to functions, that shape and control the biosphere.
- After completing this course, students will feel more confident engaging scientists, academics, and policy makers in discussions relating to the biological aspects of environmental problems.

Course Expectations:

As with any graduate offering, ***this will not be an easy course***. The successful student **must read assignments, study supporting materials, and prepare assignments outside of class**. Self-directed study skills are important. Students need to organize material logically and communicate well orally and in writing. **The emphasis will be on understanding the basics.**

Please turn off cell phones or pagers before class begins. **Professional behavior and adherence to the GMU Honor Code are expected. Absenteeism should be limited to illness or emergencies.** Students should notify the instructor before class whenever possible if they must miss a class. Students will need to work with the instructor to determine whether class activities can be made up later, although this is likely to be difficult due to schedule conflicts. Students should contact classmates to obtain notes and assignments.

Professional Communication: Students are required to use their GMU email accounts for all class related communications. All emails to the instructor will be respectful and contain a professional introduction (i.e., Dear Dr. Peters) and will be signed with your full name. Students are encouraged to have a professional email signature. If emailing regarding content for a missed class, please connect with your classmates.

Disability Services: If you are a student with a disability and you need academic accommodations, please contact the Office of Disability Services (ODS) at (703) 993-2474, https://ds.gmu.edu/, and let Dr. Peters know so that we can coordinate your needs.

Assignments and Due Dates

Assignments should be prepared neatly (either hand- or type-written or computer-generated). Be sure to proofread your work to double-check facts, grammar, spelling, and consistency, completeness, and correctness. This book may help:

Ross-Larson, B. 1996. *Edit Yourself: A Manual for Everyone Who Works With Words.* W.W. Norton & Co., New York, NY.

Missed Exams

A quiz will be given at the start of each class (unless a homework assignment is due) and mid-term and final exams will be given as indicated on the schedule. If a student is seriously ill or must miss the test for another reason, notify your professor, share your doctor's note, and options for completing the test will be discussed.

Course Textbooks and Materials

Materials will be posted on Blackboard during the course. The textbook we will use for the course is:

Girard, J.E. (2013). *Principles of Environmental Chemistry*. 3rd ed.

This should be available in the GMU Bookstore. You will also find additional help in:

Sadava, D. et.al. (2017). *Life: The Science of Biology*. 11th ed. Sinauer Associates. (MacMillian Learning)

Spark Charts "Chemistry" available in the book store or online
http://www.sparknotes.com/chemistry/

Khan Academy "Chemistry" https://www.khanacademy.org/science/chemistry

Valuable web resources include:
http://www.sparknotes.com/chemistry/
https://www.khanacademy.org/science/chemistry
http://www.onelook.com (to look up terms)

Course Requirements

Besides learning core concepts in chemistry, students will prepare short presentations and take a midterm and a final exam. More information will be provided by the instructor.

Grading Criteria

The total grade received for this course will be based on the following assignments and assessments:

Percent Contribution to Total Grade		
Participation	10 %	80 pt
Five Quizzes (40 pt each, 1 dropped) and	20 %	160 pt
Five Short Presentations (32 pt each)	20 %	160 pt
Midterm Exam	25 %	200 pt
Final Exam	25 %`	200 pt
	100%	800 pts

An A+ will only be given to reward a truly outstanding effort and performance. Participation requires attendance in class and checking Blackboard for updates and notices at least once per week. The final grade will be based on this scale:

A+ = 100(+)–98, A = 97–90, A- = 89–88, B+ = 87–86, B = 85–80, B- = 79–78, C+ = 77–76, C = 75–70, F ≤ 69

Academic Integrity and our Honor Code

Academic Integrity https://oai.gmu.edu/
Honor Code https://oai.gmu.edu/mason-honor-code/

The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification. Students in this course should be aware of the following policies for completing work and taking examinations.

The Mason Honor Code Pledge: ***To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University Community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set for this Honor Code: Student Members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.***

It is important to note that materials produced for this course require creativity in organization and presentation, but that the information presented within the paper or other product must be properly acknowledged as to its source.

Diversity Policy: Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth. An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

Other Useful Campus Resources

- WRITING CENTER: B 213 Robinson Hall; 703-993-1200; http://writingcenter.gmu.edu
- UNIVERSITY LIBRARIES: "Ask a Librarian" https://library.gmu.edu/ask
- COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): 703-993-2380;
- http://caps.gmu.edu
- LEARNING SERVICES: 703-993-2999 https://learningservices.gmu.edu/
- offers many good study skills workshops and academic coaching!
- ACADEMIC COUNSELING PROGRAM: 703-993-2380: http://caps.gmu.edu/learningservices/academiccounseling.php
- Disability Services: https://ds.gmu.edu/

Tentative Lecture Schedule: The following weeks will include lectures on significant environmental topics and the chemistry needed to understand the topic at a professional level. Students are expected to prepare for each lecture by doing the assigned work prior to class. Assignments will include: reading assigned chapters from the text book and videos. These will be posted on Blackboard or in the PowerPoint PDFs. Students will also prepare short PowerPoint presentations (no longer than 10 minutes).

****Extremely TENTATIVE SCHEDULE FOR SPRING 2020****

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Lecture and Reading Assignments

Week	Lecture	Reading or Other Assignments
1 January 21	Introductions, syllabus, overview of environmental science, measurements, units, uncertainties, scientific method, matter, elements, chemistry, and mercury contamination	Chapter 1 History of the world in 2 hours http://www.youtube.com/watch?v=qdLFCz1Y508 Also browse http://www.scaleofuniverse.com/
2 January 28	Overview of Chemistry Select topics for next week's presentations	Chapter 2 NOVA Hunting Elements http://www.pbs.org/wgbh/nova/physics/hunting-elements.html Also browse http://www.ptable.com/ *Prepare assigned short presentations*
3 February 4	Earth's Soil and Agriculture • Nitrogen • Phosphorus • Iron • Humus	Chapter 3 *Prepare assigned short presentations*

Week	Lecture	Reading or Other Assignments
	• Soil Erosion	
4 February 11	Quiz 1 on previous topics Earth's Atmosphere/Climate Change • Carbon dioxide • Ozone • Urban development • Methane • Water vapor	Chapters 4 and 5 *Prepare assigned short presentations*
5 February 18	Air Pollution • Nitrogen oxides • Sulfur dioxide • Volatile organic compounds • Smog • Regulations	Chapter 6
6 February 25	Air Pollution Measurements Quiz 2 – Atmosphere and pollution Review of first half of the semester	Study for Midterm Exam
7 March 3	**Midterm Exam**	Chapter 7 *Prepare assigned short presentations*
8 March 10	**SPRING BREAK**	ENJOY!
9 March 17	Return Midterm Exam Water Resources • Unique properties of water • Alkalinity • Acid rain	Chapters 8 and 9 *Prepare assigned short presentations*

Week	Lecture	Reading or Other Assignments
	• Ocean acidification • Water management	
10 March 24	Water Pollution, Water Treatment, Water Analysis • Nutrients • Organic wastes • Pathogenic microbes • Sewage treatment • Water reuse Quiz 3 Water	Chapter 10 *Prepare assigned short presentations*
11 March 31	Energy • Petroleum • Natural gas • Coal • Electricity • Regulations	Chapters 11 and 12 *Prepare assigned short presentations*
12 April 7	Alternative Energy Sources • Nuclear power • Radiation • Solar energy • Water power • Biomass	Chapter 13 *Prepare assigned short presentations*
13 April 14	Quiz 4 Energy Toxicology • Determining toxicity • Detoxification • Carcinogens • Teratogens • Mutagens	Chapters 14 and 15 *Prepare assigned short presentations*
14	Inorganic and Organic Chemicals	Chapters 16, 17, 18

Week	Lecture	Reading or Other Assignments
April 21	• Bioaccumulation • Lead or Cadmium or Arsenic • Polychlorinated hydrocarbons • Persistent, bioaccumulative, toxic pollutants • Regulations	*Prepare assigned short presentations*
15 April 28	Pesticides, Asbestos, Waste Disposal • Insecticides • Herbicides • Asbestos • RCRA • Hazardous waste conversions Quiz 5 Chemical contaminants and concerns (grade and return in class) **Final Exam Provided**	Work on Final Exam
16 May 12	**Submit Final Exam**	

Notes: